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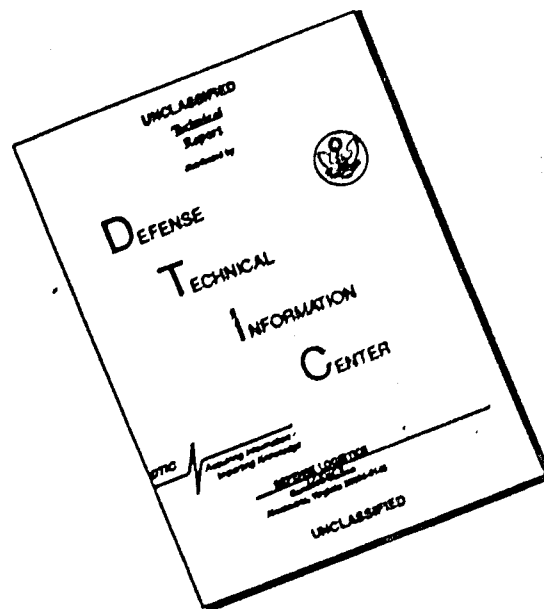
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DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, D.C. 20310

IN REPLY REFER TO
AGAM-P (M) (15 Nov 67) FOR OT RD 670522

29 November 1967

SUBJECT: Operational Reports--Lessons Learned, Headquarters, 20th Engineer Battalion (Combat), Period Ending 31 July 1967

TO: SEE DISTRIBUTION

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2. Information contained in this report is provided to insure appropriate benefits in the future from Lessons Learned during current operations, and may be adapted for use in developing training material.

BY ORDER OF THE SECRETARY OF THE ARMY:



C. A. STANFIELD
Colonel, AGC
Acting The Adjutant General

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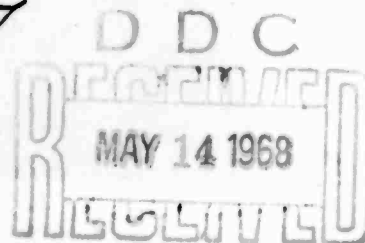
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HEADQUARTERS

EOC-20E-3

20th Engineer Battalion (Combat)
APO San Francisco 96318

12 August 1967

SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65), for Quarterly Period Ending 31 July 1967

THRU: Commanding Officer
937th Engineer Group (Cbt)
APO 96318

Commanding General
18th Engineer Brigade
APO 96307

Commanding General
United States Army, Vietnam
ATTN: AVC-LH
APO 96307

Commander In Chief
United States Army, Pacific
ATTN: GPOP-MH
APO 96358

TO: Assistant Chief of Staff for Force Development
Department of the Army (ACSFOR DA),
Washington, D.C. 20310

Section I. Significant Organization or Unit Activities:

1. General:

a. At the beginning of the report period, the Battalion Headquarters, Headquarters Company, Company B, and the 584th Engineer Company (LE) were located in the 4th Division's Camp Enari Base Camp, Pleiku, Republic of Viet Nam. Company B was involved in base camp cantonment construction. The 584th (LE) Company (-), was providing direct support for quarry operations at Danner Quarry (ZA075311), and equipment support for the Combat Engineer Line Companies. Company A was located at Jackson's Hole (YA895309), Forward Command Post of the 1st Brigade 4th Infantry Division, and was engaged in Line of Communication Construction for the Division trains and forward maneuver elements. The scope of Company A's work included massive recapping and upgrading operation on Routes QL-19, 14B and 509. In order to accomplish this project, one earth moving platoon, one dump truck platoon, one engineer line platoon, and various other smaller elements were attached to the unit. The majority of the effort expended on the project was concerned with recapping the

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roads, shaping the crown, and improving and augmenting drainage facilities. Laterite was used exclusively as the capping material. For this purpose, three laterite pits, effectively dispersed, were opened and operated at various times during the project, dependant upon their distance from the work site. Laterite extracted from these pits is rated at good to excellent quality, a fact that has been verified during subsequent months of heavy rain. Existing drainage facilities were inadequate and generally in serious need of repair. During the entire project, much of the work was expended in installing adequate culverts, and in constructing suitable drainage and relief ditches. As of 1 May, the unit was working east on QL-19 just east of the junction with 14B. Company C was at Combined Arms Hill approximately 800 meters west of Route 14B in the vicinity of YA893376. The mission of the company was to upgrade the existing road to a one way, Class 50 all weather road from the intersection of Routes 14B and 509 vicinity YA901447 to YA896335. The Company's mission, upon completion of this project was to continue upgrading Route 509 from the intersection of 14B and 509 west to the intersection of Routes 509 and 509B vicinity YA873461. However, Company C, owing to a shortage of heavy equipment, was eventually relieved of it's responsibility on Route 509 and Company A, 20th Engineer Battalion (Cbt) eventually was assigned the mission of upgrading Route 509. At the beginning of the report period Company D, 20th Engr Bn was completing work on the Oasis Airfield Complex, vicinity ZAI128. The final phases of construction consisted of application of asphalt and burlap, laying of MX-19 and MBAL matting, completion of access roads, and making the final drainage corrections. On 6 May, upon completion of the Oasis Airfield project, Company D, 20th Engineer Battalion made a unit move from Oasis to Duc Co, YA8425; Company D undertook the mission of QL-19 road rehabilitation in and around the Duc Co Special Forces Camp. On 10 May, elements of the Quarry Platoon, 584th Engineer Company (IE) occupied a bivouac site and reopened Danner Quarry, ZA075311. On 15 May Company A (-) deployed from Jackson's Hole, YA895309, to Polei Djereng with the mission of upgrading Route 509 and laying MX-19 matting on the parking apron of an existing airfield. On 15 May 2nd Platoon, Company D moved from Duc Co to Polei Djereng (YA863457), to assist Company A in laying MBAL matting on the apron of the Polei Djereng Airfield. On 21 May Company A completed road work and airfield surfacing, vicinity of Polei Djereng, and returned to base camp at Jackson's Hole. On 21 May Company D undertook the mission of rebuilding the Duc Co Airfield. On 21 May Company A was assigned the mission of road maintenance in the Jackson's Hole area of operations. On this day the 3rd Platoon of Company A returned to Camp Enari to assist Company B in base camp development. On 22 May Company C made a unit move from Combined Arms Hill (YA893376), to Danner Quarry to assist Quarry Platoon, 584th Engineer Company (IE) with quarry operations, and begin construction of the QL-19 tank trail. On 22 May the 3rd Platoon Company D returned to Duc Co after the completion of the airfield MX-19 matting.

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project at Polei Djereng. On 24 May, 2nd Platoon Company D relocated from Duc Co to Camp Enari to assist 20th Engineer Battalion (-) on base camp construction. On 26 May Company A received the mission to construct the Bay 148 tank trail. On 29 May tank trail projects of Companies A and C were deferred till after monsoon seasonal rains. On 29 May Company C was assigned the mission of improving the drainage posture and interior road net of the 173rd Airborne Brigade's bivouac at Catecka, ZA205345. On 29 June 3rd Platoon, Company C deployed from Catecka to Camp Enari to assist in base camp improvements of drainage areas. On 29 June 2nd Platoon Company C was committed from Catecka to Oasis to repair T-17 membrane on airfield. On 2 July Company D (-) completed earthwork construction of the Duc Co airfield and rejoined the 20th Engineer Battalion (-) at Camp Enari to assist in base camp development. On 3 July Company C (-) halted work efforts at Catecka and relocated CP to main bivouac area, Danner Quarry. Work ceased when the 173rd Airborne Brigade was alerted for combat operations in Kontum Province. On 3 July 2nd Platoon, Company C completed Oasis membrane repair and rejoined Company at Danner Quarry. On 10 July, Company A was committed to surface the Duc Co airstrip with MBAL SSP. Company A (-) remained at Jackson's Hole while 3rd Platoon, Company A departed base camp at Camp Enari and established a tactical bivouac area at the Duc Co Airfield Complex. On 20 July 1st Platoon, Company B departed Camp Enari for Ban Blech (AQ9555). Mission, repair T-17 membrane surface on airfield and improve drainage and road nets into the Ban Blech Special Forces Camp. At the close of the reporting period, the Battalion was actively engaged in the following missions:

- (1) Quarry and Rock Crusher Operations, 85-937/N-66.
- (2) Operational Requirements, 22-937/N-67.
- (3) 4th Division Interior Road Paving, OICC P-815/07.
- (4) 4th Division Access Road Paving, OICC Q-458.
- (5) Rotary Wing Aircraft Hangar, CD 63-215-03-T-6S.
- (6) Protective Bunkers, 16-937/N-67.
- (7) Mortar Bunkers, 34-937/N-67.
- (8) 11,492 Man Cantonment, CD 66-236DC-937.
- (9) AFRT Radio Station, CD 63-223-04-T-6S.
- (10) Warehouse Storage, 7-937/N-67.

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- (11) Install Well Water Fill Point, Catecka, 32-937/V-67.
- (12) Water Pump Station and Pipeline, CD 65-251DC-937.
- (13) Maintenance of Routes 19W, 14B, and 509.
- (14) Upgrading of Duc Co Airfield, 08-937/OS-67.
- (15) Repair of Ban Blech Airfield and QL-14, 19-937/OS-67.
- (16) Maneuver Road Construction (Parallel Tank Trail - QL-13W), 04-937/OS-66.
- (17) Maneuver Road Construction (Parallel Tank Trail - Rte 14B), 14-937/OS-66.
- (18) Upgrading of Route 509, 08-937/OS-66.

2. Personnel:

a. At the beginning of the report period, the assigned strength of the 20th Engineer Battalion, to include attachments of the 584th Engineer Company (LE) and Company D, 299th Engineer Battalion (Cbt) was 37 Officers, 4 Warrant Officers, and 1,048 Enlisted Personnel.

b. Personnel replacements were adequate during the report period. As of 31 July 1967 the shortage of a Personnel Officer and Maintenance Officer are serious, but not considered critical. The Maintenance Officer's position is actually filled by the Communications Officer as an additional duty, and the arrangement has proved adequate.

c. At the close of the report period, the Battalion and 584th Engineer Company (LE) had an assigned strength of 35 Officers, 3 Warrant Officers, and 880 Enlisted Personnel.

d. During the report period the Battalion suffered 1 KIA, and 5 WIA. Personnel of the Battalion have been officially recognized by receipt of 3 Purple Hearts, 7 Army Commendation Medals and 1 Air Medal for meritorious service. As of 31 July awards pending include, one Bronze Star Medal for Valor, 14 awards of the Bronze Star Medal meritorious service or achievement, 4 awards for meritorious service, 3 awards of the Air Medal for meritorious service, and 3 awards of the Purple Heart.

e. At present the Battalion is employing 33 quarry workers and 49 civilian carpenters on a permanent hire basis. Additionally, an average

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of 155 AIK daily hire workers are utilized within the Battalion.

f. The Battalion Chaplain holds two Protestant Services on Sundays, one in the Battalion area and one at a forward line company committed to operational support. To enhance the religious training within the Battalion, a film of a religious nature is shown on Sunday nights, and this is supplemented by the singing of hymns. A Roman Catholic service is held each Thursday night in the Battalion Chapel, and the Battalion Chaplain organizes transportation service on Sundays to send the Roman Catholic men of the Battalion to adjacent units that have Roman Catholic worship. An average of 350 men per week participated in the Battalion's religious services during this report period.

3. Intelligence and Security:

a. During the report period the Battalion Intelligence Section continued to maintain contact with intelligence collecting agencies to further the combat intelligence aspect of the operational support missions. Continued emphasis was placed on Engineer Reconnaissance to develop knowledge and locations of construction materials and to provide early warning of critical areas of maintenance of existing line of communications and facilities.

b. The existing Camp Enari OPLAN commits the Battalion to furnish perimeter guards to the 1st Battalion, 8th Infantry, 4th Infantry Division's subsector on perimeter defence. The Battalion is required to commit Engineers to augment Infantry unit reconnaissance patrols; this situation develops approximately three times a week, with the augmentation consisting of five to seven men.

4. Operations and Training:

a. The responsibility of base camp construction, both vertical and horizontal was assigned to Company B during this report period. Intermittently, throughout the report period Company B was reinforced by detached line platoons when the tactical situation and requirements allowed.

b. The 4th Infantry Division has organized an active self-help building program, and shortages of building materials as noted in the previous report period have been overcome. The Battalion's prefab yard has produced approximately 296 building modules while working an average 10 hour day. The Battalion prefab yard is operated by 5 enlisted men and 49 indigenous carpenters. Total square footage of facilities provided 4th Infantry Division and supporting units during period were:

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13,000 sq ft of mess halls

10,414 sq ft of maintenance facilities

30,000 sq ft of warehouse space

60,800 sq ft of administrative facilities

576,000 sq ft of troop housing

e. In addition to the self-help achievements of the Division, units of the 20th Engineer Battalion have constructed:

4 each 40' x 100' Pascoe warehouses

3 each 20' x 100' Tropical warehouses

1 each 20' x 60' Personnel building

1 each 20' x 160' S-4 warehouse

1 each 20' x 100' CIF building

1 each 20' x 160' Headquarters building

1 each 96' x 96' Open storage shed for prefab building

4 each 20' x 100' Troop billets

d. And commenced on 1 each 177' x 192' aircraft hanger, additionally:

8 each 20' x 100' Concrete pads were poured

2 each 30' x 100' Concrete pads were poured

1 each 13' x 26' Concrete pad was poured

1 each 20' x 60' Concrete pad was poured

1 each 20' x 160' Concrete pad was poured

5. Operational Support Missions:

a. On 6 May Company D ceased work on the Oasis Airfield Complex, out loaded, and departed for Duc Co at 1150 hours. An alert order informed the Company to be prepared for road rehabilitation work.

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On 7 May Company D began road rehabilitation on Route QL-19W. The task was organized into four phases: Clearing the right-of-way with dozers; cutting trapezoidal drainage ditches with 290M scrapers; and filling, shaping, and compacting the travel way with a six inch cap of laterite. Two culvert sites were implaced along the 5 kilometers of road responsibility. A laterite pit was opened at YA085239, resulting in a reduced haul distance of 4 kilometers from borrow pit to work area. Cap material was loaded by front loader and hauled by dump truck to the project site. A total of 8,000 yards of laterite was eventually hauled to complete the laterite cap. Company D's road construction mission was to continue to work from Due Co, east in an effort to link up with construction elements of Company A that were working west from road junction 14B - QL-19W to Due Co.

On 8 May Company A reached a predetermined check point, Bridge #4 (YA075291). Bridge site #4 had been established as Company A's eastern boundary of QL-19W area responsibility.

On 9 May Company A split it's road construction efforts; one element began upgrading QL-19 in a westerly direction in order to meet Company B coming from the west. A second element moved north and began construction and rehabilitation of Route 14B north of Jackson's Hole.

On 10 May the quarry platoon of the 584th Engineer Company (IE) reopened Danner Quarry (ZA075311) with the mission of supporting the Battalion road construction projects and base camp requirement with 4" (-) and 1 1/2" (-) rock respectively. Quarry equipment at this time consisted of 75TPH primary and secondary crusher units.

On 13 May, Companies A and D met forces on QL-19 at YA867268. Company D assumed responsibility of QL-19W from Due Co to road junction 14B - QL-19. Company A redeployed to concentrate its efforts on road construction, Route 14, north of Jackson's Hole.

On 15 May, 2nd Platoon, Company D composed of 31 EM and one officer, left Due Co for Palei Djereng. The purpose of the move was to assist Company A in placing a new MBAL parking apron at the Palei Djereng Airfield.

On 15 May, Company A (-) deployed to Palei Djereng (YA863457) with the dual mission of upgrading Route 509, and construction of a 150' x 750' MBAL parking apron. A rear detachment was left at Jackson's Hole to supervise equipment construction effort and install drainage structures as required on Route 14B.

On 20 May, Company C completed it's mission of road construction to the northern most reach of Route 14. Construction responsibility of

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Route 509 was transferred from Company C to Company A owing to Company C's shortage of heavy equipment.

On 20 May, Company D completed upgrading requirements of QL-19W from Due Co east to road junction 14B --QL-19W (YA904270), and began consolidating equipment and personnel to begin M8A1 SSP surfacing project on Due Co Airfield (YA845257).

On 21 May, Company A completed Route 14B area responsibility, Jackson's Hole north to YA 901447, with the installation of a triple barrel 72" culvert at YA895352. Company A also completed Polei Djereng M8A1 parking apron and Route 509 rehabilitation projects. Attached elements were released to their parent units, and Company A relocated to Jackson's Hole.

On 21 May, Company D began work on the Due Co Airfield. A survey of the airfield revealed that the existing strip was 100 ft wide x 3,000 ft long with no overruns. A new laterite pit was opened at YA843257 and capping operations of the airfield commenced. In three days 2,500 cubic yards of laterite cap were placed on the western 800 ft of the runway. Only 200 ft of the runway had been completely compacted and blue-topped before heavy rains began. Rains continued for 20 days, during which time the effective work accomplished amounted to cutting and shaping all airfield drainage ditches, removing about 75% of the laterite cap which had become saturated, and maintenance of Route QL-19W.

On 21 May, an Engineer reconnaissance team located a new rock source, approximately 2.3 kilometers west of the operational Danner Quarry (ZA075311).

On 21 May, Company A was given the mission of road maintenance in the Jackson's Hole area of operations. These roads included QL-19 from the bridge at YA975291 to Due Co; on 14B from the junction with QL-19 to the junction of 509; and on 509 northwest to Polei Djereng. The scope of work consisted of maintaining sections of road damaged by heavy rains. Maintenance operations were conducted by the 1st and 2nd Platoons, while the 3rd Platoon returned to Camp Enari to work on base camp development. The maintenance was concerned with insuring proper drainage. Culverts needed cleaning, ditches needed clearing and reshaping, and standing water had to be drained off the road. It was necessary to recap a good portion of 14B north, as it appeared that an inferior grade of laterite had been used on the original capping operation. The scope of work and efforts expended in completing this mission would last up to, and include, the 13th of July. Another major repair project conducted during this period (21 May - 13 July) was the widening of 14B south 3 to 4 meters over stretches totaling approximately 1,000 meters. This work

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proved to be very effective, and drastically reduced the number of vehicles sliding into the ditches during wet weather.

On 22 May, Company C moved from its base camp at Combined Arms Hill (YAB93376) to Danner Quarry on QL-19W (ZA075311). Company C was assigned Project Directive 04-937/OS-66 which consisted of construction of a two-way, Class 55 tank trail from Dragon Mountain Base Camp parallel to Route QL-19W to Duc Co. The Company was given a secondary mission of keeping QL-19W open to traffic during the monsoon season.

On 22 May 3rd Platoon, Company D returned to Duc Co from its diversion project of assisting Company A in placing M8A1 matting on the Polei Djereng Airfield.

On 24 May, 2nd Platoon, Company D relocated from Duc Co to Camp Enari. 36 EM and one officer, with organic TO&E equipment were committed to the Camp Enari base camp development.

On 24 May, Company C began construction on assigned tank trail project.

On 26 May, Company A received the secondary mission of constructing a tank trail from the intersection QL-19 and 14B to the vicinity of the SP/CIDG camp at Polei Djereng. The trail was to parallel the existing roads, and was to have the same specifications as a two lane military road, with the exception that there would be no laterite cap. It was emphasized when the directive was issued that this project would not be allowed to interfere with the road maintenance mission. Due to a lack of equipment, progress on the trail was somewhat hampered.

On 29 May, the tank trail projects of Companies A and C were deferred till the end of the monsoon season since heavy equipment and compaction equipment could not be used effectively. At this cessation Company A had cleared 60% of the tank trail right-of-way and shaped 20% of the trail to specifications; Company C had also reached approximately the same percentiles of progress.

On 29 May 1967, the 173rd Airborne Brigade at their bivouac site at Cateoka, vicinity ZA205345, became bogged down in mud and was unable to get their supply areas or maneuver in their base camp. Company C was committed to provide drainage and build all weather road capabilities throughout the 173rd area. The scope of work consisted primarily of ditching, culvert installation and preparing a 2.1 mile road network to be capped with rock.

From 12 June to 26 June the Pleiku area experienced a period of

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relatively dry weather with little or no rain.

On 13 June, Company D opened a new laterite borrow pit at YA857263. Laterite was of extremely good quality and 2,000 cubic yards of this select borrow were hauled, placed, shaped, and compacted into the Duc Co Airfield.

On 20 June, Company D commenced work on a forward support heliport (FASH). Scope of work consisted of construction of 21 each heli-pads, 2 Class III and 1 Class V protective berms within the Duc Co airfield complex. In the designated area of the FASH, a minefield was uncovered. Before work could continue it was necessary to sweep and clear the area. A total of 88 M-14 and M-16 mines were located and destroyed before the project commenced.

On 29 June, 3rd Platoon, Company C departed from Catecka to assist base camp development efforts at Camp Enari.

On 29 June, 2nd Platoon Company C was committed from Catecka project to the Oasis airfield to repair T-17 membrane on the forward assault heliport.

On 1 July the 173rd Airborne Brigade moved Headquarters from Catecka to Kontum to engage in Operation Greely.

On 2 July, Company D completed necessary earth work required for the placement of an MBAL SSP surface on the Duc Co Airfield. Company D departed Duc Co and rejoined the 20th Engineer Battalion (-) at the Camp Enari Cantonment area. From 2 July to the end of the report period Company D completed 2 each steel frame 40' x 100' pascoe type warehouses, remodeled the interior of the dental clinic, completed an operations building for the 4th Aviation Battalion, 4th Infantry Division and constructed 3 each 20' x 100' tropical BEQ's.

On 3 July Company C (-) ceased work efforts on the 173rd Airborne Brigade's Catecka cantonment area with approximately 95% of the original assigned project complete. Company C (-) relocated back to main bivouac area, Danner Quarry.

On 3 July, 2nd Platoon, Company C completed T-17 membrane repairs at Oasis FASH, and rejoined Company at Danner Quarry. Company C (-) working from Danner Quarry Command Post began to devote full effort in maintaining QL-19W from the intersection of QL-19W and QL-14 to the new quarry site, ZA056316.

On 10 July, Company A received a priority directive to cover the

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airstrip at Duc Co with MC-30, and to emplace M8A1 landing mat on 3,500 feet of runway. For this project, 3rd Platoon was moved from base camp to Duc Co on 10 July. The first five days were occupied with unloading material, surveying the strip, and coating area to be covered by M8A1 with MC-30.

On 15 July, M8A1 laying began. The work progressed well ahead of schedule, and an average of 18 to 20 thousand square feet a day was laid.

On 16 July, the strip was closed to C-130's, 18 July to C-123's, and on 22 July to CV-2's. The strip was opened to CV-2's and C-123's on 30 July, and tentatively scheduled to be opened for C-130 traffic by 1 August.

On 24 July, Company A received an additional directive to construct 150 ft square turnarounds at each end of the runway.

On 31 July, the Duc Co Airfield matting project was complete except for the application of MC-30 on several sections of the airstrip.

On 20 July, 1st Platoon, Company B was committed from base camp construction to the Ban Blech Airstrip (AQ9555) to make necessary repairs on T-17 membrane surface covering. 1st Platoon, Company B had completed 95% of Ban Blech airstrip as of 31 July.

6. Training:

The Battalions basic 2 hour per week training program continued to be supplemented by an ambitious on the job training program, as well as attendance by Battalion members at special courses sponsored by the 537th Engineer Group (Cbt) and 18th Engineer Brigade.

7. Supply:

a. During this reporting period, the Battalion continued to increase its Class IV construction material receipts and issues, attempting to finalize completion of building structures prior to the anticipated monsoon rains. However, the lack of electrical materials has seriously hindered completion of these buildings and subsequent acceptance by the Post Engineers. The following quantities of major Class IV materials have been placed on requisition in support of approved construction projects.

Cement: 69,313 BGS

Nails: 87,917 LBS

Lumber: 3,188,927 BF

Electrical Wire: 434,493 FT

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Culvert: 12,508 FT

Electrical Fixtures: 21,275 EA

Corrugated Roofing: 67,888 SH

Circuit Breakers: 768 EA

b. In addition, the following specific materials were received and issued during this period for base development in the Dragon Mountain Base Camp (Project CD 66-236DC-937):

<u>ITEM</u>	<u>RECEIVED</u>	<u>ISSUED</u>
1 x 6 x RL	381,542 BF	317,011 BF
1 x 8 x RL	911,964 BF	552,569 BF
1 x 10 x RL	103,580 BF	38,600 BF
1 x 12 x RL	39,768 BF	49,018 BF
2 x 4 x RL	628,132 BF	754,140 BF
2 x 6 x RL	251,734 BF	111,860 BF
Corrugated Roofing	65,990 SH	61,044 SH
8d Nails	21,158 LBS	23,769 LBS
12d Nails	14,918 LBS	12,218 LBS
16d Nails	19,960 LBS	20,695 LBS
Cement	61,069 BGS	61,069 BGS

c. Major repairs of two airfields have necessitated moving vast quantities of MBAL, penepime, T-17 membrane and T-17 adhesive to the respective sites. Coordination was affected with 8th Transportation Group and 948 bundles of MBAL have been through shipped from Qui Nhon to Duc Co. In addition the Battalion, utilizing 25-ton semi-trailers with 4 x 4 material as dunnage, has transported 688 drums of penepime to Duc Co. Chinook helicopters have been utilized to support airfield operations at Ban Blech. POL to include 500 gallon diesel pods, slung externally, rations, T-17 membrane, and adhesive are flown to Ban Blech from Camp Enari.

d. The Battalion water point teams continued their support of combat operations and of Camp Enari, base camp of the 4th Infantry Division. During this period the two water point teams produced and issued 1,388,168

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gallons of potable water and 1,114,943 gallons of potable water respectively. Non-availability of repair parts has deadlined two 1500 CPH water purification sets during the entire reporting period.

8. Medical:

a. During the quarter 2,872 out patients and 48 quarters patients were treated in the Battalion Aid Station.

b. The medical section has maintained a suspense file on immunization records to insure adequate and timely immunization of all personnel.

c. An aggressive anti-malaria program continues to be followed by the Battalion. Both Dapsone (DDS) and Chloroquine Primaquine tablets are included in this program. A very practical solution to insure the daily dosage of Dapsone for each man has been roster distribution at squad and section level. A policy has been initiated within the Battalion whereby Company Charge of Quarters physically check the billet areas at night to insure that all personnel are using their mosquito nets. Final reports are rendered to the Battalion Duty Officer.

9. Communication:

a. During this period it has been noted that AN/PRC 25 radios were being turned in for repair because of short range transmission or low performance; however, when these same radios were checked out by higher echelon maintenance they were found to be in perfect working condition. It was found out that the fault lay in the fact that antenna connections were poor or the battery was weak. All personnel concerned were notified of the situation and cautioned to make a thorough check of antenna connections and batteries before turning in radios for repair.

b. It was also noted during this period that microphones and handset-headsets for the new series radios were being turned in for damaged connections. It was found that the connector plug pins were being broken off or worn down by carelessness in installing them on the radio sets. All personnel concerned were notified to use extreme care in connecting and disconnecting the microphones and handset-headsets to the radios.

10. Maintenance:

Supply of repair parts continues to remain the major problem in the maintenance field. Direct exchange items, such as generators, voltage regulators, brake cylinders (wheel and master) and brake shoes for all types of vehicles are in short supply. The system of being unable to direct exchange Engineer repair parts has led to long periods of deadline time of critical

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equipment while awaiting supply channels to follow through with requisitioned parts. Parts are the major problem, everyone is aware of the delays, what more can be said!

Section II Commander's Observations and Recommendations:

1. Personnel:

a. ITEM: Shortage of Quarry Operators

DISCUSSION: An Engineer Light Equipment Company is authorized by TO&E 6 enlisted men to operate a 25 TPH rock crusher. At present, some Light Equipment Companies are operating 75 TPH rock crushers on a 24 hour basis. To provide operators for this double shift it is necessary to supplement the authorized crew from within available resources, which in all cases are critical MOS personnel essential to the overall mission of the company. This augmentation from available resources has the impact of taking away some of the Light Equipment inherent capability of double shift operations of assigned engineer equipment.

OBSERVATION: Recommend that MTO&E's be established to make allowances for additional men to operate Quarry equipment on a double shift basis.

2. Operations:

a. ITEM: Load Bearing Capacity of Soils

DISCUSSION: Upon initiation of construction of a 175' x 190' prefabricated aircraft hangar at Dragon Mountain, it was noted that the column footing design on the plans was based upon a soil pressure of 2,000 per sq ft. No information was available on the undisturbed load bearing capacity of the silty clay deposits at Dragon Mountain. The only available soil testing methods in the Pleiku area were CBR and penetrometer. Neither of these methods provide an accurate determination for the undisturbed bearing capacity of clay. In order to obtain the desired information, it was decided to construct a field expediant plate bearing aparatus. This device was constructed out of wood and provided a 5 ft square loading platform from which the load was transferred to a one foot square bearing plate. Loading consisted of placing sacks of cement on the loading platform. The device was steadied by four tag lines. During testing, a hole was dug to footing elevation and the bottom leveled but not compacted. Incremental loads in cement sacks were applied at half hour intervals and the settlement readings were taken by surveyors using a rod and leve. From inspecting gulleys nearby, it was determined that the soil was consistent to sufficient depth to render the results of the test valid for

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a much larger load bearing surface. Three tests were run at three different locations. The results were essentially the same and were as follows:

(1) Up to 1800 lbs the settlement was approximately .017 feet per thousand pounds.

(2) Upon application of the 2400 lbs load, the deflection ratio increased to 0.40 feet per thousand pounds.

This ratio remained relatively constant up to 4,000 lbs when loading ceased. Based on these results, it was decided to assume a safe load bearing capacity for the soil of 1,600 lbs per sq ft and the footings were redesigned, the size being increased to 5 ft square.

OBSERVATION: Though this method of testing is somewhat crude by proper soil testing standards, with proper supervision it can give a good estimate of the bearing capacity of soil.

b. ITEM: Use of T-17 Membrane for Pavement Subgrade Protection

DISCUSSION: Rainfall on a base course prepared for paving, frequently causes a delay in operation. In many cases the subgrade must be reworked, allowed to dry, additional rock placed, and finally the surface reshaped. T-17 membrane was utilized as a protective cover during the monsoon period. Standard 33' x 100' sections of membrane were employed. An overlap of two feet was used between adjacent sections of membrane, with sandbags being placed on the perimeter of the sheet to prevent the wind from lifting the membrane off of the road surface. It was determined that twenty men could place one section of T-17 membrane on a dry subgrade in five minutes. If the surface was wet it required twenty men ten to fifteen minutes to place one section of T-17 membrane. Wear on the membrane was not noticeable; however, care must be used not to drive vehicles on the membrane because sharp rock can puncture the fabric.

OBSERVATION: The use of T-17 membrane to protect road subgrade has resulted in the saving of many man and equipment hours. If weather breaks, an hour is required to dry surface prior to paving. However, one to two days are necessary to dry and prepare the surface if not covered. The use of membrane coverings is quite worthwhile.

c. ITEM: Defensive Positions

DISCUSSION: Bivouac area defensive positions consisted of sandbagging sleeping tents, squad sized bunkers on the perimeter, and platoon sized mortar bunkers adjacent to the tents. 25% of the personnel

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occupied the perimeter nightly. Although no injuries were incurred during several mortar and recoilless rifle attacks, better aimed enemy fire and VT fuses rather than point detonating rounds could have conceivably caused high casualty rates among personnel sleeping in tents when attacks started.

OBSERVATION: In small isolated camps every effort should be expended to construct squad-sized, or smaller sleeping bunkers rather than to utilize tents.

d. ITEM: Availability of Laterite Sources

DISCUSSION: Laterite was found in widespread locations in the Duc Co vicinity; near the crests of hills, in level terrain of teak forests, and at the edge of swamps. As increased time was spent in the vicinity, it became apparent that lateritic soil could be found close to almost any work site if enough overburden were removed.

OBSERVATION: The advantages of a short haul distance to a work site generally outweigh the time consumed in removing a large amount of overburden from a nearby laterite source. When haul distance exceeds one mile, time spent digging test holes up to eight foot deep close to the work site can prove to be profitable.

e. ITEM: Clearing Anti-Personnel Minefield

DISCUSSION: A minefield in a proposed forward assault heliport location was situated in an overgrown area not readily accessible to vehicular traffic. Initial clearing efforts of burning off undergrowth and probing revealed that the field was composed of M-14 and M-16 anti-personnel mines with no anti-vehicular mines. Burning of the underbrush and probing for plastic mines was not only dangerous but time consuming.

OBSERVATION: A Rome Plow with heavy sandbagging was used with outstanding multiple results. The undergrowth was scraped off at ground level; most of the M-14 mines were detonated by the tracts; most of the M-16 anti-personnel mines fuses were sheared off or bent at a 90 degree angle; the blasts of the few M-16 mines which detonated were contained by the blade and the underbrush piled in front. A complete sweep with detectors and probes was made after the Rome Plow finished and the remaining mines were quickly found and destroyed.

f. ITEM: Pan Ditches

DISCUSSION: In view of the heavy rains during the monsoon season, there is a distinct tendency among supervisors to over-design pan ditches to

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a great extent. During the monsoons, military roads frequently become very slick. This includes well constructed roads capped with high quality laterite. As a result, vehicles frequently slide off the roads and if the pan ditches are over-designed, damage to the vehicles can result. In addition, the subsequent recovery of the vehicle can become an extensive operation.

OBSERVATION: Pan ditches should not be over-designed to the extent that they serve as a hazard to vehicular traffic.

g. ITEM: Emplacing M8A1

DISCUSSION: In laying M8A1 landing mat, the greatest efficiency was achieved when the M8A1 was mechanically handled and transported to the greatest extent possible. Manually handling and transporting individual panels is very time consuming as well as fatiguing. Excellent use was made of pole trailers, pulled by 5-tons, which were loaded by crane with M8A1 bundles in the storage area. These trailers were then backed up to within a few feet of the work area, where the bands were broken on the bundles, and the panels unloaded individually by hand and placed on the runway.

OBSERVATION: In working with M8A1 landing mat, manual handling and transporting should be reduced to a minimum for increased efficiency. Pole trailers serve as an excellent intermediate transport vehicle, as they can be moved to within close proximity of the work area, and are easily loaded and unloaded.

h. ITEM: Anchoring M8A1

DISCUSSION: Profitable use can be made of a grader for cutting anchorage ditches along the edge of a runway being covered with M8A1 landing mat. However, several drawbacks to this method should be taken into consideration. It is frequently not possible to cut a ditch sufficiently deep to meet anchorage specifications. In this case, grader work must be supplemented with hand labor and/or the utilization of a clay spade. Secondly, there is often a tendency to cut the anchorage ditch far in advance of the area in which the M8A1 is actually being emplaced. If heavy rains are encountered, this practice can lead to serious drainage problems, as well as to the possibility of subsequent soft spots in the shoulders of the runway. A 5-ton dump truck serves as a satisfactory method of bending the anchoring panels, with the subsequent slope of the panel being determined by the depth and shape of the anchorage ditch. Placing a short length of 4" x 4" beneath to panel at the desired bending point will insure a satisfactory bond. In addition, placing a second panel over that portion of the anchoring panel which is not to be bent will greatly reduce

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the degree of undesirable buckling.

OBSERVATION: When using a grader for cutting anchorage ditches for M8A1, care must be taken to insure that specifications are met and unnecessary drainage problems do not arise. Ditches should be backfilled and compacted as soon as the anchorage has been completed. 5-ton trucks serve adequately for bending anchoring panels. The supplemental use of a piece of 4" x 4" will insure a precise bend at the desired location.

1. ITEM: Alignment of M8A1

DISCUSSION: When placing M8A1 landing mat on a runway or similar facility, considerable care and attention is required to insure that the mat remains properly aligned. It was found that delaying operations until the runway had been surveyed accurately was time well spent. Once the operation is in progress, the alignment must be frequently checked. This is particularly critical immediately following the beginning of operations. The use of a 5-ton chained to a protruding anchoring panel proved to be a satisfactory method of restoring alignment. This requires an experienced operator to reduce the possibility of damage to the matting. Internal alignment must also be maintained to insure that bayonet connectors seat properly in adjacent panels. To restore internal alignment, one or more rows must be shifted or stretched in the appropriate manner and direction. This can also be accomplished with a 5-ton.

OBSERVATION: Proper alignment is a critical factor in a satisfactory M8A1 operation. It is most desirable that a survey team be attached to the operational unit for the duration of the project. Accurate preliminary survey work is essential, as are frequent (recommended 6-8 rows) spot checks. A 5-ton truck is a satisfactory method of restoring alignment.

j. ITEM: Loading device for Blast Rock

DISCUSSION: The loading devices authorized a Light Equipment Company for quarry operation are two 10-ton crawler cranes with 3/4 cubic yard shovel-fronts and four rubber tire bucket loaders. To increase outload capabilities, bucket loaders are often employed to load blast rock on trucks to haul to the primary crusher site. The problem encountered is the damage to the rubber tires when Bucket Loaders are being worked in Rock Blast Area. Over a four week period an average of three tires were being used everyday.

OBSERVATION: Recommend the use of a crawler type loading device that will be sufficient to supply a 75 ton per hour crusher.

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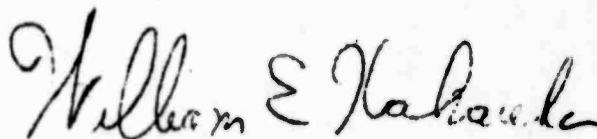
SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65), for Quarterly Period Ending 31 July 1967

k. ITEM: Protection of Fresh Concrete During Inclement Weather Operations

DISCUSSION: With the consideration of water damage to concrete pads poured in a monsoon area, a method had to be found where concrete could be poured, protected and worked with trowels during inclement weather.

OBSERVATION: A shelter was designed to offer this protection. The shelters design considerations were that it would be wide enough to cover a reasonable sized width of pad (20 ft), light enough to be considered portable, and small and flexible enough to be dismantled and transported to a project site with organic platoon capabilities. The best available solution for the immediate requirement was found to be individual truss frames that could be sectionalized into linear components by connecting purlins, thus affording the builder the advantage of obtaining any desired length of coverage necessary. This frame, as indicated in Inclosure #1, is covered with scrap canvas and has been utilized on concrete pouring projects with excellent results.

FOR THE COMMANDER:



2 Incl

- 1-Concrete Protective Structure
- 1-Organizational Structure

WILLIAM E. KAKAREKA
2LT, CB
Adjutant

DISTRIBUTION:

- 2-CC, USAP, ATTN: GPOP-MH
- 3-CG, USARV, ATTN: AVC-DH
- 6-CG, USAECV(P), ATTN: AVCC-BC
- 2-CG, 18th Engr Bde
- 5-CO, 937th Engr Gp (Cbt)
- 1-File
- 10-Reference

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23 EGC-CO (12 Aug 67)

1st Ind

SUBJECT: Operational Report - Lessons Learned (RCS CSFOR 65), for Quarterly Period Ending 31 July 1967.

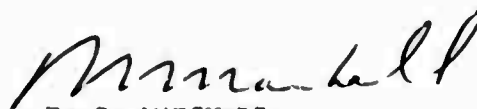
DEPARTMENT OF THE ARMY, HEADQUARTERS, 937TH ENGINEER GROUP (COMBAT), APO 96318, 14 August 1967

TO: Commanding General, 18th Engineer Brigade, ATTN: AVBC-C, APO 96377

1. The subject report, submitted by the 20th Engineer Battalion (Combat), has been reviewed and is considered an excellent report of organizational activities.

2. I concur in the observations and recommendations of the Battalion Commander with the following additional comments:

Page 4, paragraph 2 c - Company D, 299th Engineer Battalion (Cbt) returned to the control of their parent unit on 24 June 1967.



R. C. MARSHALL
Colonel, CE
Commanding

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AVBC-C (12 Aug 67)

2nd Ind

LT Hegmann/dlr/DBT-163

SUBJECT: Operational Report - Lessons Learned For the Period Ending
31 July 1967

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28 AUG 1967


Headquarters, 18th Engineer Brigade, APO US Forces 96377

TO: Commanding General, U.S. Army Engineer Command, Vietnam (Prov)
ATTN: AVCC-P&O, APO US Forces 96491

1. This headquarters has reviewed the report submitted by the 20th Engineer Battalion and considers it an excellent report of unit activities and accomplishments for the period ending 31 July 1967.

2. This headquarters concurs with the observations and recommendations of the Battalion Commander with the following additional comment:

Section II, paragraph 1, Item - Shortage of quarry operators - Augmentation of additional quarry and crusher personnel has been requested by MTOE action. However, because of the present moratorium on MTOE submittals and pending action on the original requests, no further action is contemplated at this time.


HAROLD J. ST CLAIR
Colonel, CE
Commanding

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AVCO-P&O (12 Aug 67)

3rd Ind

CPT ROWLEY/prf/4581

SUBJECT: Operational Report-Lessons Learned for the Period
Ending 31 July 1967

HEADQUARTERS, UNITED STATES ARMY ENGINEER COMMAND
VIETNAM (PROV) APO 96491 **16 SEP 1967**

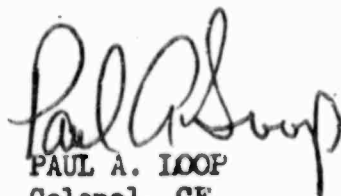
TO: Commanding General, United States Army Vietnam, ATTN: AVGHC-DH
APO 96375

This headquarters concurs with the 20th Engr Bn ORLL report as written, subject to the following comments:

a. Reference Section II, paragraph 1 and paragraph 2, 2nd Indorsement. Item: Shortage of Quarry Operators. Concur with 2nd Indorsement. Units are being requested to submit MTOE for review by this headquarters in anticipation of removal of moratorium.

b. Reference Section II, paragraph 2j; Concur. Engineer Command has recently received a number of large capacity crawler mounted cranes. These cranes are being allocated to units with a quarry mission to lessen the need for front loaders to load blast rock.

FOR THE COMMANDER:


PAUL A. LOOP
Colonel, CE
Chief of Staff

Info eye turn:

CG, 8th US Army, ATTN: Engr
CG, 18th Engr Bde
CG, 937th Engr Gp
CO, 20th Engr Bn

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AVHOC-DST (12 Aug 67) 4th Ind
SUBJECT: Operational Report-Lessons Learned for the Period Ending
31 July 1967 (RCS CSFOR-65) (U)

HEADQUARTERS, UNITED STATES ARMY VIETNAM, APO San Francisco 96375

TO: Commander in Chief, United States Army, Pacific, ATTN: GPOP-OT,
APO 96558

1. This headquarters has reviewed the Operational Report-Lessons Learned for the period ending 31 July 1967 from Headquarters, 20th Engineer Battalion (AZ2A) as indorsed.

2. Concur with basic report as indorsed. Report is considered adequate.

FOR THE COMMANDER:


STANLEY E. SCHULTZ
Major, AGC
Asst. Adjutant General

2 Incl
RC

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GPOP-DT (12 Aug 67)

5th Ind

SUBJECT: Operational Report for the Quarterly Period Ending 31 July 1967
from HQ, 20th Engineer Battalion (UIC: WAZTO) (RCS CSFOR-65)

HQ, US ARMY, PACIFIC, APO San Francisco 96558

9 NOV 1967

TO: Assistant Chief of Staff for Force Development, Department of the
Army, Washington, D. C. 20310

1. This headquarters has evaluated subject report and forwarding
indorsements and concurs in the report as indorsed.

2. Action is being taken to assure that subordinate units of HQ USARV
are advised that no moratorium exists on MTOE actions.

FOR THE COMMANDER IN CHIEF:

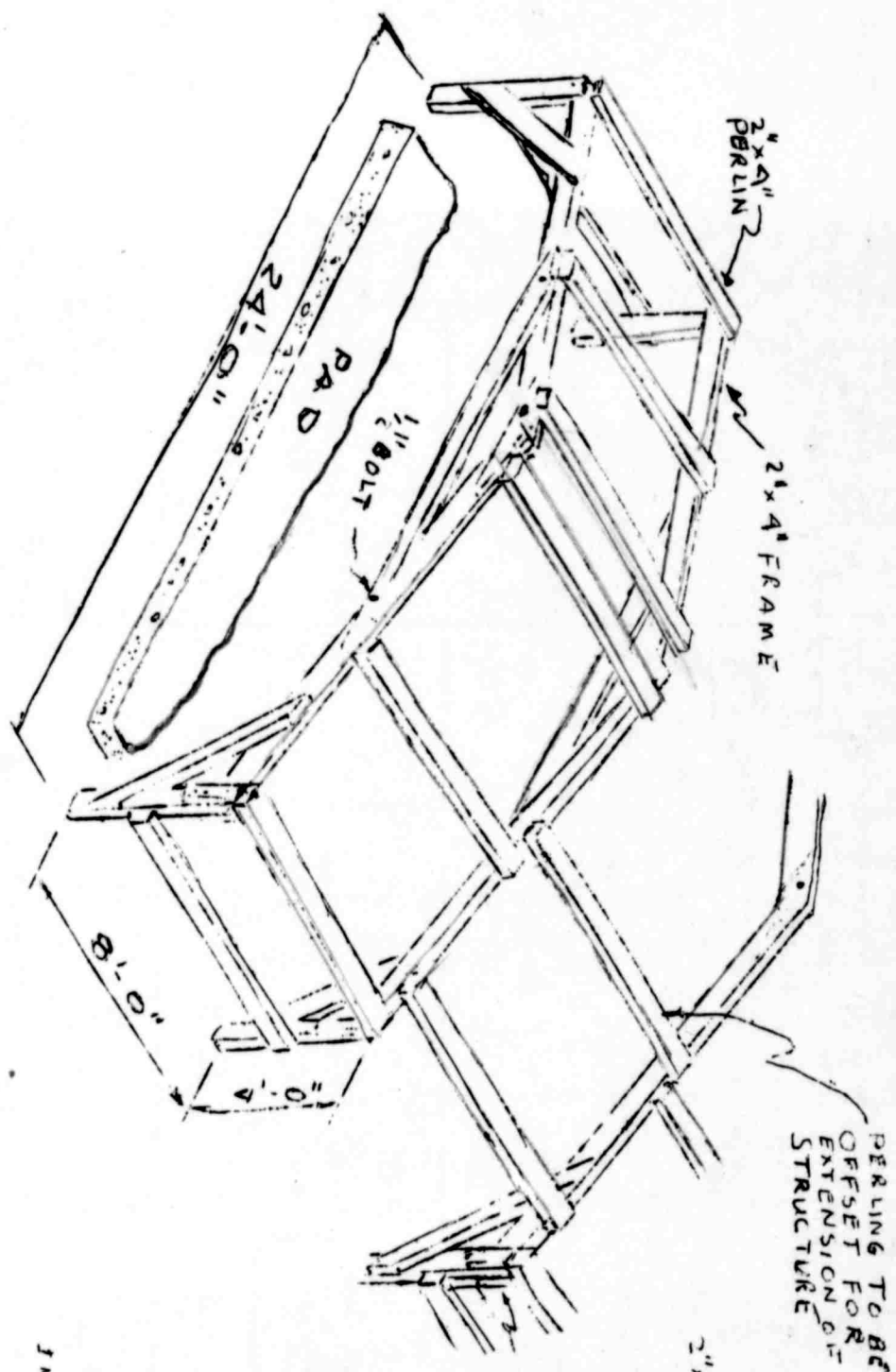


HEAVRIN SNYDER
CPT, AGC
Asst AG

2 Incl
nc

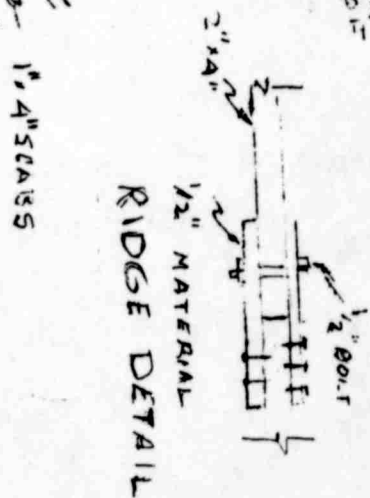
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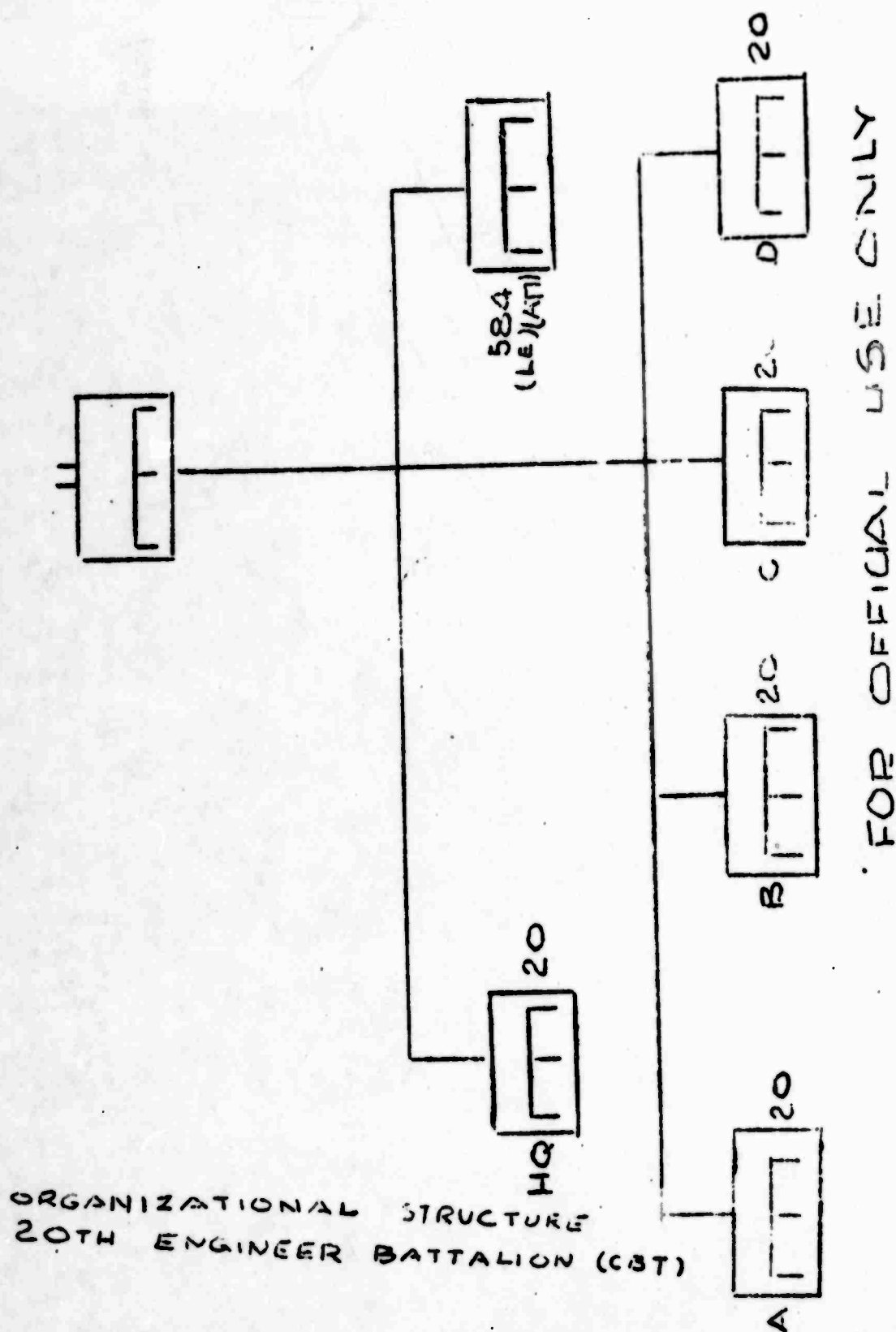


JACK SUKUT I

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